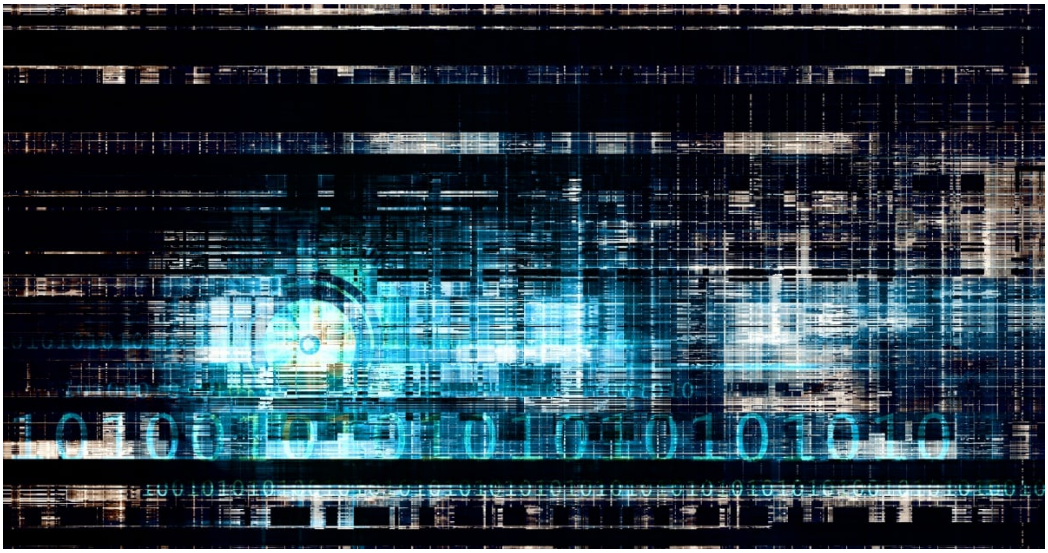
Daggerfly: Espionage Group Makes Major Update to Toolset



APT group appears to be using a shared framework to create Windows, Linux, macOS, and Android threats.

The Daggerfly (aka Evasive Panda, Bronze Highland) espionage group has extensively updated its toolset, introducing several new versions of its malware, most likely in response to exposure of older variants. The new tooling was deployed in a number of recent attacks against organizations in Taiwan and a U.S. NGO based in China, which indicates the group also engages in internal espionage. In the attack on this organization, the attackers exploited a vulnerability in an Apache HTTP server to deliver their MgBot malware.

Among the new additions to Daggerfly's arsenal are a new malware family based on the group's MgBot modular malware framework and a new version of the Macma macOS backdoor. While Macma is a previously documented threat, it had hitherto been of unknown authorship. However, Symantec's Threat Hunter Team has now found evidence suggesting that it is developed by Daggerfly.

Active for at least a decade, Daggerfly is primarily known for its development and use of the MgBot framework. In 2023, Symantec reported a Daggerfly intrusion against a telecoms operator in Africa involving previously unseen plugins for MgBot.

Macma update

Macma is a macOS backdoor that was first documented by Google in 2021 but appears to have been used since at least 2019. At the time of discovery, it was being distributed in watering hole attacks involving compromised websites in Hong Kong. The watering holes contained exploits for iOS and macOS devices. Users of macOS devices were targeted with a privilege escalation vulnerability (CVE-2021-30869) which allowed the attackers to install Macma on vulnerable systems.

Macma is a modular backdoor. Functionality includes:

- Device fingerprinting
- Executing commands
- Screen capture
- Keylogging
- Audio capture
- Uploading and downloading files

Following its exposure, further details about the threat were published by Objective-See and SentinelOne.

Recent variants of Macma found by Symantec exhibit evidence of ongoing development. One version (SHA256: 003764fd74bf13cff9bf1ddd870cbf593b23e2b584ba4465114023870ea6fbef) contained a different main module (SHA256: 1f5e4d2f71478518fe76b0efbb75609d3fb6cab06d1b021d6aa30db424f84a5e) to previously documented versions. The main difference lies in strings that appear to function as configuration data (see Figure 1).

A second version of Macma (SHA256: dad13b0a9f5fde7bcdda3e5afa10e7d83af0ff39288b9f11a725850b1e6f6313) contained what appeared to be incremental updates to the existing functionality. Some of the identified updates

included:

- Updated modules in its appended data
- Updated file directory paths and filenames (and related string quotes when constructing command-lines for processes to start)
- Additional debug logging

Its main module (SHA256: fce66c26deff6a5b7320842bc5fa8fe12db991efe6e3edc9c63ffaa3cc5b8ced) exhibited evidence of more extensive modification. This included:

- New logic to collect a file's system listing, with the new code based on Tree, a publicly available Linux/Unix utility.
- Modified code in the AudioRecorderHelper feature
- Additional parametrisation
- Additional debug logging
- Addition of a new file - param2.ini – that is related to settings around a feature named "autoScreenCaptureInfo"

In addition to this, it too had different strings containing configuration data (see Figure 1).

Another module from this variant (SHA256: eff1c078895bbb76502f1bbad12be6aa23914a4d208859d848d5f087da8e35e0) contained modified code to adjust the size of a created screen capture, which apparently related to the aspect ratio when resizing the capture.

```
__const:0000000100191AC0 aAbcdefg01234hi db 'abcdefg01234hijklmnopq56789rstuvwxyz'
__const:0000000100191AC0                                          ; DATA XREF: sub_10003
__const:0000000100191AE4 a123_1_170_152  db '123.1.170.152',0     ; DATA XREF: sub_10003
__const:0000000100191AF2                 db 6 dup(0)
__const:0000000100191AF8 a12580          db '12580',0
__const:0000000100191AFE                 db 4 dup(0)
__const:0000000100191B02 a12583          db '12583',0
__const:0000000100191B08                 db 4 dup(0)
__const:0000000100191B0C aPpwda          db 'ppwda',0
__const:0000000100191B12                 db 22h dup(0)
```

```
__const:0000000100191AC0 aAbcdefg01234hi db 'abcdefg01234hijklmnopq56789rstuvwxyz'
__const:0000000100191AC0                                          ; DATA XREF: sub_100032
__const:0000000100191AE4 a172_16_170_249 db '172.16.170.249',0    ; DATA XREF: sub_100032
__const:0000000100191AF3                 db 5 dup(0)
__const:0000000100191AF8 a51101          db '51101',0
__const:0000000100191AFE                 db 4 dup(0)
__const:0000000100191B02 a51104          db '51104',0
__const:0000000100191B08                 db 4 dup(0)
__const:0000000100191B0C aPpwda          db 'ppwda',0
__const:0000000100191B12                 db 22h dup(0)
```

```
__const:00000001001AA260 aAbcdefg01234hi db 'abcdefg01234hijklmnopq56789rstuvwxyz'
__const:00000001001AA260                                          ; DATA XREF: sub_10003
__const:00000001001AA284 a103_243_212_98 db '103.243.212.98',0    ; DATA XREF: sub_10003
__const:00000001001AA293                 db 5 dup(0)
__const:00000001001AA298 a23000          db '23000',0
__const:00000001001AA29E                 db 4 dup(0)
__const:00000001001AA2A2 a23003          db '23003',0
__const:00000001001AA2A8                 db 4 dup(0)
__const:00000001001AA2AC a3eec2672f8c8df db '3eec2672f8c8df7f',0
__const:00000001001AA2BD                 db 17h dup(0)
```

Figure 1. Configuration strings from the main module of a Macma variant documented in 2021 by Objective-See (top) and strings from and bottom).

Attribution to Daggerfly

Although Macma was widely believed to have been linked to advanced persistent threat (APT) activity, it has hitherto not been linked to a particular group. However, Symantec has found evidence to suggest that it is part of the Daggerfly toolkit. Two variants of the Macma backdoor connected to a command-and-control (C&C) server (103.243.212[.]98) that was also used by an MgBot dropper.

In addition to this shared infrastructure, Macma and other known Daggerfly malware including Mgbot all contain code from a single, shared library or framework. Elements of this library have been used to build Windows, macOS, Linux, and Android threats. Functionality provided by this library includes:

- Threading and synchronization primitives
- Event notifications and timers
- Data marshaling
- Platform-independent abstractions (e.g. time)

An example of this library code is seen when the magic string "inp" is sent over a SOCK_DGRAM socket:

```
sendto(*(_DWORD *)(v2 + 56), "inp", 3, 0, (const struct sockaddr *)(v2 + 60), 16);
```

While sendto() may be used to communicate with other hosts in general, here the communication is with a local machine (127.0.0), and could be even be threads in the same process. Another example involves the magic string "tim" being sent over a socket similar to the following:

```
sendto(*(_DWORD *)(v1 + 56), "tim", 3, 0, (const struct sockaddr *)(v1 + 60), 16);
```

Symantec has yet to find any matching code in public repositories. Shared code and shared infrastructure between Macma and other Daggerfly tools suggests that Macma is also part of the Daggerfly toolkit.

New backdoor

A new addition to Daggerfly's toolkit is a Windows backdoor (Trojan.Suzafk), which was first documented by ESET in March 2024 as Nightdoor (aka NetMM) when it was observed being used alongside Mgbot. Suzafk was developed using the same shared library used in Mgbot, Macma, and a number of other Daggerfly tools.

Suzafk is a multi-staged backdoor capable of using TCP or OneDrive for C&C. The malware contained the following configuration, indicating the functionality to connect to OneDrive is in development or present in other variants of the malware:

```
ReadMe=ConnONEDRIVE;Version=256;Tag=15ad490f332f3d9a;DownloadUrl=http://103.96.131.150:19876/30_1410402
{"refresh_token":"REDACTED","client_id":"4aa6708f-f3c8-4511-8118-
5a7208be6a44","client_secret":"REDACTED"};DownloaderSavePath=C:\Programdata\Office\;HttpServerFolder=C:
Files\Common Files\Cloudata\;
```

Another configuration to use a TCP connection for C&C purposes is also present in the backdoor:

```
ReadMe=ConnTCP;Version=256;Tag=15ad490f332f3d9a;DownloadUrl=http://103.96.131.150:19876/30_1292836936.e
Files\\Common Files\\Cloudata\\;
```

The loader (SHA256: 5687b32cdd5c4d1b3e928ee0792f6ec43817883721f9b86ec8066c5ec2791595) drops two files: Engine.dll and MeitUD.exe. MeituUD.exe is a legitimate application named DAEMON Tools Lite Helper. Engine.dll is a loader DLL that sets persistence via scheduled tasks and loads the final payload in memory.

The backdoor has embedded code from the al-khaser project, a public code repository aimed to detect virtual machines, sandboxes, and malware analysis environments. It also creates the folders C:\ProgramData\Office\EFir and C:\ProgramData\Office\Temps and stores additional network configuration data under the C:\ProgramData\Office\sysmgr file XOR encrypted with the key 0x7A.

The network configuration in plaintext has the following parameters and values:

```
[InfoRecord]

CMD_SEND_SN=0

LOCAL_CALENDAR

SEND_EMAIL_NUM=0

LOCAL_MAC_ADDR=[mac address]

PROXY_INFO

[CtrlTermKey]

KEY

BSK=[sha256 value]

PRK=[sha256 value]

[CtrlTermKeyStatus]

STATUS=1

[CtrlTermKeyVer]

VER=1
```

```
[ManageTermKey]

[ManageTermKeyStatus]

[ManageTermKeyVer]

[ManageTermServerInfoOffset]

[ManageTermEmailTo]

[ManageTermUseCreateCloudDirAlgorithm]
```

Next, the malware creates a cmd.exe shell to send and receive commands from the C&C server (103.96.131[.]150) via open pipes. Additionally, the following commands can be executed:

```
ipconfig
systeminfo
tasklist
netstat
```

Heavily Resourced

New findings provide a clearer picture of the capabilities and resources behind Daggerfly. The group can create versions of its tools targeting most major operating system platforms. In addition to the tools documented here, Symantec has seen evidence of the ability to Trojanize Android APKs, SMS interception tools, DNS request interception tools, and even malware families targeting Solaris OS. Daggerfly appears to be capable of responding to exposure by quickly updating its toolset to continue its espionage activities with minimal disruption.

Protection/Mitigation

For the latest protection updates, please visit the Symantec Protection Bulletin.

Indicators of Compromise

If an IOC is malicious and the file available to us, Symantec Endpoint products will detect and block that file.

IOC	Description
003764fd74bf13cff9bf1ddd870cbf593b23e2b584ba4465114023870ea6fbef	Macma
1f5e4d2f71478518fe76b0efbb75609d3fb6cab06d1b021d6aa30db424f84a5e	"UserAgent" Macma component
dad13b0a9f5fde7bcdda3e5afa10e7d83af0ff39288b9f11a725850b1e6f6313	Macma
570cd76bf49cf52e0cb347a68bdcf0590b2eaece134e1b1eba7e8d66261bdbe6	"kAgent" Macma component
eff1c078895bbb76502f1bbad12be6aa23914a4d208859d848d5f087da8e35e0	"arch" Macma component
d8a49e688f214553a7525be96cadddec224db19bae3771d14083a2c4c45f28eb	"at" Macma component
955cee70c82bb225ca2b108f987fbb245c48eefe9dc53e804bbd9d55578ea3a4	"com.USAgent.mv.plist" Macma component
fce66c26deff6a5b7320842bc5fa8fe12db991efe6e3edc9c63ffaa3cc5b8ced	"USAgent" Macma component
5687b32cdd5c4d1b3e928ee0792f6ec43817883721f9b86ec8066c5ec2791595	Trojan.Suzafk dropper
49079ea789e75736f8f8fad804da4a99db52cbaca21e1d2b6d6e1ea4db56faad	Trojan.Suzafk DLL
5c52e41090cdd13e0bfa7ec11c283f5051347ba02c9868b4fddfd9c3fc452191	Trojan.Suzafk unpacked
4c3b9a568d8911a2a256fdc2ebe9ff5911a6b2b63c7784da08a4daf692e93c1a	Linux malware with Daggerfly library
ef9aebcd9022080189af8aa2fb0b6594c3dfdc862340f79c17fb248e51fc9929	Linux malware with Daggerfly library
0cabb6780b804d4ee285b0ddb00b02468f91b218bd2db2e2310c90471f7f8e74	Linux malware with Daggerfly library
3894a8b82338791764524fddac786a2c5025cad37175877959a06c372b96ef05	Linux malware with Daggerfly library
3a6605266184d967ab4643af2c73dafb8b7724d21c7aa69e58d78b84ebc06612	Linux malware with Daggerfly library
65441ea5a7c0d08c1467e9154312ac9d3fdd3ca9188b4234b5944b767d135074	Linux malware with Daggerfly library
103.243.212[.]98	Macma and MgBot C&C server
103.96.131[.]150	Trojan.Suzafk C&C server
103.96.128[.]44	MgBot C&C server